

Oregon's Mid-Coast Basin Road Digitizing Protocol

Project Overview

The objective of this project is to improve the accuracy and precision of the existing Oregon roads geodatabase by developing a complete geospatial database of the transportation system within Mid-Coast total maximum daily load (TMDL) study watersheds. The project will involve use of airborne Light Detection and Ranging (LiDAR) data and aerial photos in a Geographic Information System (GIS) to digitize all visible roads and edit the roads in the existing transportation database to improve precision and accuracy. Such roads may include federal, state, and county highways; local access roads; logging and forestry roads; private drives; and older unpaved roads that may now be used as trails.

Road Digitizing Protocol

- 1) Heads-up digitizing will be conducted within ArcGIS version 10.1 (Basic license level).
- 2) Cadmus staff will work within the project area defined by Oregon Department of Environmental Quality (ODEQ) - the "Roads_Digitization_Watersheds" shapefile.
- 3) All roads will be digitized in a separate line feature class, and not within the existing roads geodatabase.
- 4) Digitizing will be conducted in the same projection as the LiDAR data (NAD1983 HARN Oregon Lambert Feet Intl), and then re-projected into the state standard of NAD 1983 Oregon Lambert Feet Intl for the final deliverable.
- 5) The digitizer will rely on a LiDAR-derived elevation model to determine whether a road exists. LiDAR is an active remote sensing technology that collects high resolution elevation measurements of topography and above ground features.
- 6) There may be instances where a road only appears in the aerial image but is not apparent from the LiDAR data or the street maps. In these cases, the road will be digitized and the Notes attribute will read "Interpreted from ortho."
- 7) All roads, regardless of width, will be represented as linear features that approximately follow the centerline of the road.
- 8) The digitizer will perform a desktop verification of road locations using National Agriculture Imagery Program (NAIP) Mosaic 7.5' orthos and the high resolution NHD flowline shapefiles.
- 9) Where possible, the digitizer will determine the road name or ID using an ESRI basemap (e.g., Open StreetMap) or the 2011 Oregon signed routes GIS layer.¹ Staff will rely on the LiDAR data only, and *not* the basemap or signed routes layer, to determine the location of the road.
- 10) The digitizer will be diligent about differentiating between roads and other features such as streams, stream gullies and landslides. If the digitizer is unclear about whether it is a road or a stream based on interpretation of the LiDAR data, aerial images, and NHD flowlines, the digitizer will manually

¹ http://navigator.state.or.us/sdl/data/shapefile/k24/signed_rtes_2011.zip

digitize the line and specify any concerns in the ProdFlag and Notes attributes.

- 11) All roads will be digitized at a consistent map scale within ArcGIS (1:2,000). The digitizer will periodically zoom out to gain familiarity with the larger area, but the digitizing will only be conducted at the 1:2,000 scale or greater.
- 12) For continuity, all roads will be digitized in a standard editing mode (i.e. not 'stream mode'), unless the digitizer determines that the interpreted road geometry necessitates a different editing mode.
- 13) Where an existing road feature does not align with the LiDAR data at the 1:2,000 scale, the correct path will be digitized.
- 14) In cases where an existing road feature does align with the LiDAR data at the 1:2,000 scale, the existing road feature will be copied into the new shapefile to provide a complete roads dataset for the subbasins.
- 15) Each linear feature will terminate at a road intersection, where the road ends, or at the watershed boundary. Where digitized roads intersect another road (either existing or newly digitized road), the endpoint of the new feature will be snapped to an existing or previously digitized feature. The existing or previously digitized feature will also be split at the point where the new feature is snapped (i.e., at the new road intersection).
- 16) The following attributes will be added to each new feature as it is digitized:
 - a. RoadName. This attribute will be the road name or the road ID. In some cases this information may not be available from the ESRI basemap or the signed routes layer. In those cases, this field will be blank.
 - b. RoadType. This attribute will capture the type of road digitized, based on available information from an ESRI basemap and the digitizer's best approximation. The codeset domain for this attribute includes:
 - i. "Federal/State highway" (e.g., major highways and signed routes such as US highway 101 or Oregon route 34)
 - ii. "Secondary highway" (e.g., secondary non-signed routes that appear to be major county thoroughfares or other collector roads)
 - iii. "Local road" (e.g. local public or private roads on any land use such as urban, rural residential, forest, or agricultural)
 - iv. "Private drive" (e.g., private driveways terminating at a residential structures)
 - v. "Unknown"
 - c. ProdFlag. This code will identify the level of producer confidence in the accuracy of the feature (i.e., is this the likely road path or is it possibly a stream?). The codeset domain includes:
 - i. "0" (e.g., no concerns, road digitized according to protocol)

- ii. "1" (e.g., the road is possible a stream or a trail)
 - iii. "2" (e.g., spatial accuracy of road centerline is uncertain)
 - d. Notes. Any additional notes about the feature.
- 17) The following attribute will also be included in the roads feature class, though the information will be added after digitizing has been completed and prior to delivering the features file to ODEQ.
- a. Producer. This code will identify the staff member that digitized the feature.
- 18) The following metadata will be provided to the ODEQ by Cadmus following the digitizing process, for their internal records.
- a. The names of each data source used to digitize the roads.
 - b. The names of any supplemental data sets (e.g., roads, hydrography) used to assist with the interpretation of the images.